

Technology Delivery

Industry of the Future

Fiscal Year 2004 Annual Report



Industrial Technologies Program

Boosting the productivity and competitiveness of U.S. industry through improvements in energy and environmental performance



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Industrial Technologies Program — Boosting the Productivity and Competitiveness of U.S. Industry

Industry consumes 33 percent of all energy used in the United States. By developing and adopting more energy efficiency technologies, U.S. industry can boost its productivity and competitiveness while strengthening national energy security, improving the environment, and reducing emissions linked to global climate change.

The U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) works in partnership with U.S. industry to increase the efficiency of energy and materials use, both now and in the future. EERE's Industrial Technologies Program (ITP) is working to build the Industries of the Future through a coordinated program of research and development (R&D), validation, and dissemination of energy efficiency technologies and operating practices to reduce energy intensity in the industrial sector. ITP develops, manages, and implements a balanced portfolio that addresses industry requirements throughout the technology development cycle. The primary long-term strategy is to invest in high-risk, high-return R&D. Investments are focused on technologies and practices that provide clear public benefit but for which market barriers prevent adequate private sector investment.

ITP focuses its resources on a small number of energy-intensive materials and process industries that account for over 55 percent of industrial energy consumption.

- Aluminum
- Chemicals
- Forest Products
- Glass
- Metal Casting
- Mining
- Steel

ITP also conducts R&D projects on enabling technologies that are common to many industrial processes such as industrial energy systems, combustion, materials, and sensors and process control systems. In addition, ITP funds technical assistance activities to stimulate near-term adoption of best energy-saving technologies and practices within industry. These activities include plant assessments, tool development and training, information dissemination, and showcase demonstrations.

New technologies that use energy efficiently also lower emissions and improve productivity. By leveraging technical and financial resources of industry and government, the ITP partnerships have generated significant energy and environmental improvements that benefit the nation and America's businesses. Energy-intensive industries face enormous competitive pressures that make it difficult to make the necessary R&D investments in technology to ensure future efficiency gains. Without a sustained commitment by the private and public sectors to invest in new technology R&D and deployment, the ability to close the gap between U.S. energy supply and demand will be severely compromised.

CONTENTS

Executive Summary i

Technology Delivery Overview 1

Energy Use 2

The Challenge 4

Strategy for Improving Industrial Energy Efficiency 4

Key Activities 7

FY 2004 Highlights & Accomplishments 8

Tools, Publications, and Resources Available 13

How To Get Involved and Contact Information 14

How to Get Involved 14

Where to Go to Get More Information 15

Appendix A. EERE Allied Partners A-1

EXHIBITS

1. Energy Use in U.S. Industry 2

2. U.S. Manufacturing Energy End Uses 3

3. Energy Footprint for U.S. Manufacturing 3

4. Locations of the 26 Industrial Assessment Centers 5

EXECUTIVE SUMMARY

U.S. manufacturing industries face significant challenges in maintaining competitiveness in global markets. By developing and adopting more energy-efficient technologies, U.S. industry can remain a competitive world leader. Industry can achieve substantial energy-savings by implementing off-the-shelf technologies and best practices in energy management. The Industrial Technologies Program (ITP), through its Technology Delivery portfolio, funds activities that stimulate near-term investment in energy-saving technologies and practices. Improvements in energy efficiency reduce operating and maintenance costs and also eliminate waste, improve product quality, increase capacity, and reduce environmental impact.

About 60 percent of the total primary energy associated with the industrial sector is lost prior to use in specific industrial unit processes. Energy losses typically occur during power generation at off-site utilities or while fuels are in transit to the plant site. Energy losses also occur onsite during steam and electricity generation and distribution, process heating and other energy conversion processes and unit process operations. Many companies can improve their bottom-line by reducing these energy losses using ITP's Technology Delivery products and services.

A Successful Strategy with Industry

The U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) leads development of advanced energy-efficient and environmentally-friendly industrial technologies. ITP's Technology Delivery is a component of the overall EERE strategy, contributing to the goals outlined in the National Energy Policy. The objective is to provide near-term technologies and practices to industry that complement long-term R&D. Technology Delivery activities and resources support all of EERE's industry portfolios.

EERE/ITP is working to build the Industries of the Future through a strategy that is based on multi-year planning, industry involvement and input during the decision making process, and careful analysis and data based decision-making. Through Technology Delivery, ITP funds technical assistance activities to stimulate near-term adoption of the best energy-saving technologies and practices within industry. These activities include plant energy assessments, software tool development and related training, information and technology dissemination, and support for showcase demonstrations and regional energy events. To reach as many plants as possible, ITP pursues a replication strategy. Part of this strategy includes the creation of a network of EERE Allied Partners – true public-private partnerships involving entities that have the ability to reach large numbers of end-users. Allied Partners deliver energy efficiency information, products, and services; support the use of best practices in energy management; promote the replication of energy-saving strategies; and encourage technical professionals to participate in software qualification training in order to apply their knowledge to end-users.

The ITP team is a motivated, mission-driven group consisting of technology managers at DOE Headquarters, project officers in Golden, CO, and Morgantown, WV, and Regional Office staff located at the six DOE Regional Offices. Determination is a trademark of the geographically split team; their joint efforts are a testament to the “can-do” attitude of each team member.

Achieving Energy Savings: Portfolio Strategy

Industry can achieve substantial energy savings by implementing off-the-shelf technologies and energy management practices. One of the challenges for ITP will be increasing industry awareness of energy efficiency benefits and EERE products and services. Through Technology Delivery, ITP wants to impact as many energy-intensive manufacturers as possible. The major components of ITP's strategy for addressing these challenges include:

- **Public-Private Partnerships** with end-users, equipment vendors, energy suppliers, trade and technical associations, and others to disseminate information and promote replication of energy efficiency methodologies and results;

- **Assessments** to uncover inefficiencies in overall plant operations and in motor, steam, compressed air, pumping, fan, and process heating systems, and to replicate these findings within end-user companies and within relevant industrial sectors;
- **Tool Development and Training** to enable companies to self-assess plant utility systems and train plant managers and others to optimize energy use for specific energy systems or across an entire plant, with little or no capital investment;
- **Qualified Specialists and Instructors** to engage industrial suppliers and consultants in substantially increasing the awareness and application of BestPractices software tools;
- **Showcase Demonstrations and Energy Events** to highlight the benefits of energy efficiency and renewable energy technologies;
- **Emerging Technologies and Verification/Validation** activities to support independent, unbiased confirmation of energy, economic, production, and environmental benefits of innovative technologies;
- **Outreach** to provide information about proven energy management practices and technologies to create awareness and encourage action that can help companies achieve immediate energy savings; and
- **Metrics Development** to evaluate the impact of this strategy on industrial energy use.

FY 2004 Highlights

- **Public-Private Partnerships:** Completed eight Allied Partner (AP) agreements.
- **Assessments:** Completed nine plant-wide assessments (PWAs); completed 722 Industrial Assessment Center (IAC) assessment days at 630 individual plants.
- **Tool Development:** Released new NO_x tool and completed development of the fan system assessment tool (FSAT). Continued development of the plant energy profiler tool.
- **Training on Tools and Energy Management BestPractices:** Completed 80 End-User Workshops, with 1,512 participants trained in the use of EERE software tools and energy management BestPractices; completed seven Specialist Qualification Workshops, with 59 participants passing the exam to become Qualified Specialists in the use of BestPractices software tools; completed 32 awareness presentations or web-casts with 866 participants trained in the use of EERE software tools and energy management BestPractices.
- **Energy Events:** Participated in the Northeast Energy and Technology Expo and the Institute of Paper Science and Technology (IPST)/Technical Association of the Pulp and Paper Industry (TAPPI) workshop.
- **Emerging Technologies and Verification/Validation:** Successfully completed commercial-scale demonstration and verification/validation study of Nickel Aluminide Rolls in a Heat-Treating Furnace at the International Steel Group's (formerly Bethlehem Steel Corporation) Burns Harbor Plate Mill.
- **Outreach:** Issued over 80 outreach documents and maintained an up-to-date website; recorded over 990,000 page views, and over 1.8 million downloads from the BestPractices and IAC websites; initiated development of a user-centric website; and provided assistance to 1,650 information queries from ITP clients.
- **Metrics Development:** Conducted peer review of BestPractices metrics methodology and worked in cooperation with the peer review team to estimate energy-savings of 40 trillion Btu from FY 2003 activities.

TECHNOLOGY DELIVERY OVERVIEW

The Industrial Technologies Program's (ITP's) mission is to improve the energy intensity of the U.S. industrial sector through a coordinated program of research and development, validation, and dissemination of energy-efficient technologies and practices. ITP partners with industry, equipment manufacturers and other stakeholders to reduce our nation's reliance on foreign energy sources, decrease environmental impacts, increase the use of renewable energy sources and improve industrial competitiveness. Technology Delivery is an element within ITP; the other elements include Chemical and Allied Processes, Industrial Energy Systems, Materials, Sensors and Automation, and Metals and Mining.

Technology Delivery supports ITP's mission, targeting the most energy-intensive industries and plants in the United States. ITP's Technology Delivery develops, implements and disseminates energy management best practices that realize the best energy efficiency and pollution prevention options from a system and life-cycle cost perspective.

The major elements within Technology Delivery are:

Public-Private Partnerships – As part of a delivery strategy for improving U.S. energy efficiency, EERE has supported an Allied Partnership initiative to help disseminate information to the industrial, commercial, residential and government sectors. Allied Partners include equipment manufacturers and suppliers; trade, technical, and other national associations; large manufacturing companies; utilities; and public, non-profit organizations. These entities have the ability to deliver energy efficiency information, as well as products and services; support the use of best practices in energy management; promote replication of energy-saving strategies; and encourage technical professionals to participate in software qualification training. Appendix A presents a full list of Allied Partners.

Assessments – Through competitive solicitations, conduct cost-shared (up to \$100,000) plant-wide assessments (PWA) of large plants with high potential for energy-savings and replication. In addition, free energy audits are available to small and medium-sized companies (fewer than 500 employees onsite, annual sales of less than \$100 million, and an annual energy bill of less than \$2 million) through 26 Industrial Assessment Centers (IACs) located throughout the country. As a key strategy, highly encourages replication of assessment results and methodologies.

Tool Development – ITP has developed product-neutral software tools to assess energy-saving opportunities in major plant utility systems, including compressed air, fans, pumps, motors, process heating, and steam. Tool development is a collaboration involving industrial companies and trade associations with assistance from national laboratories. These tools are distributed free-of-charge to manufacturing companies through the EERE Information Center and during tool training sessions (see below), and can be downloaded from the ITP website. The tools are regularly evaluated for necessary upgrades.

Training – Provide a range of training opportunities through with Allied Partners. These include overview sessions that increase awareness of energy-savings opportunities, focused sessions to teach end-users how to apply a given software tool, and Qualified Specialist sessions to provide industry-based specialists with a comprehensive knowledge of specific software tools.

Showcase Demonstrations and Energy Events – ITP's Technology Delivery helps industry highlight the benefits of energy efficiency and renewable energy technologies by participating in EERE-wide public events. These events demonstrate how improved plant operations can increase productivity and energy-savings, reduce costs and improve environmental benefits.

Emerging Technologies and Technology Verification/Validation – As a pilot activity, validate and demonstrate emerging technologies. Technology verification/validation is an independent assessment conducted by unbiased third-parties to validate the energy, cost, production, and environmental benefits of emerging technologies during actual applications.

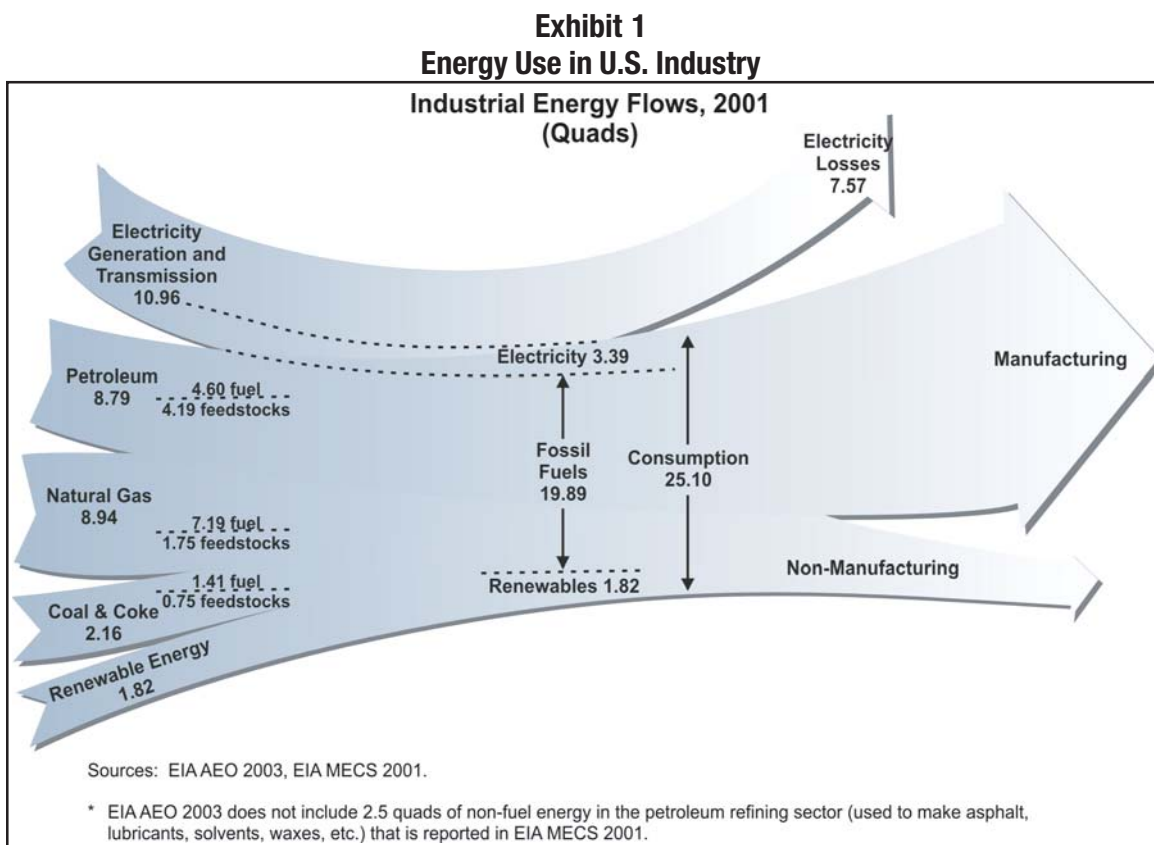
Outreach – Outreach and communication products heighten industry awareness of technologies and

practices which, if implemented, generate near-term energy benefits. Products include case studies (for PWAs, as well as other efficiency improvements), tip sheets on plant utility systems, the quarterly *Energy Matters* newsletter, resource CD-ROMs for particular industrial sectors, brochures and technical reference guides. All of these products can be downloaded from the ITP website, or accessed through EERE Information Center staff. The staff at the EERE Information Center also provides advice about ITP's products and services and offers engineering technical assistance, including motors, steam, compressed air, pumping, process heat, fans, and other topics (see "How to Get Involved and Contact Information" at the end of this document).

Metrics Development – Energy-savings are the key metric by which ITP measures its impact on industrial energy use. ITP's Technology Delivery continues to refine the methodology for estimating the impact of the BestPractices and IAC activities – including the energy-savings resulting from assessments, as well as use of the tools, training, and the technical assistance provided by the EERE Information Center. It also maintains a database that tracks all non-R&D impacts of the ITP.

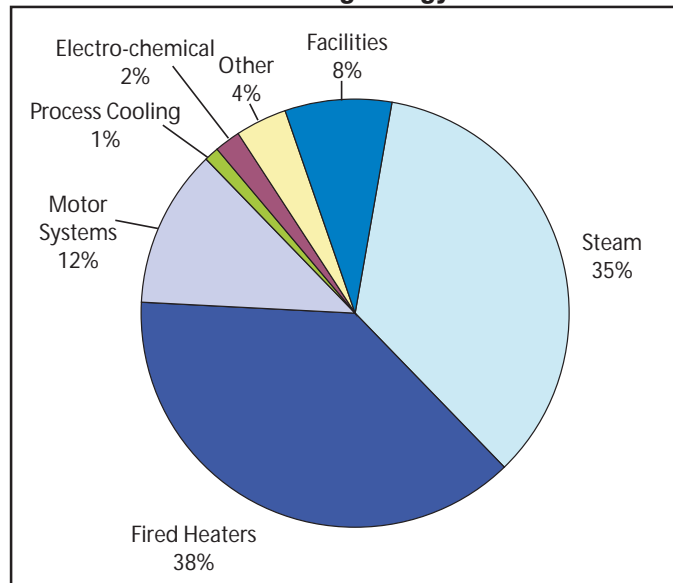
Energy Use

In 2001, industry consumed 32.7 quadrillion Btu (quads), or over one-third of the 96 quads consumed in the United States. Almost 8 quads are lost during power generation and transmission before electricity arrives at industrial plants. This represents an opportunity for combined heat and power technologies, microturbines, and other co-generation technologies located within plant boundaries. Natural gas, petroleum products, and electricity are the major energy sources used to power factories, farms, mining and construction operations. Exhibit 1 summarizes the energy flows for the industrial sector.



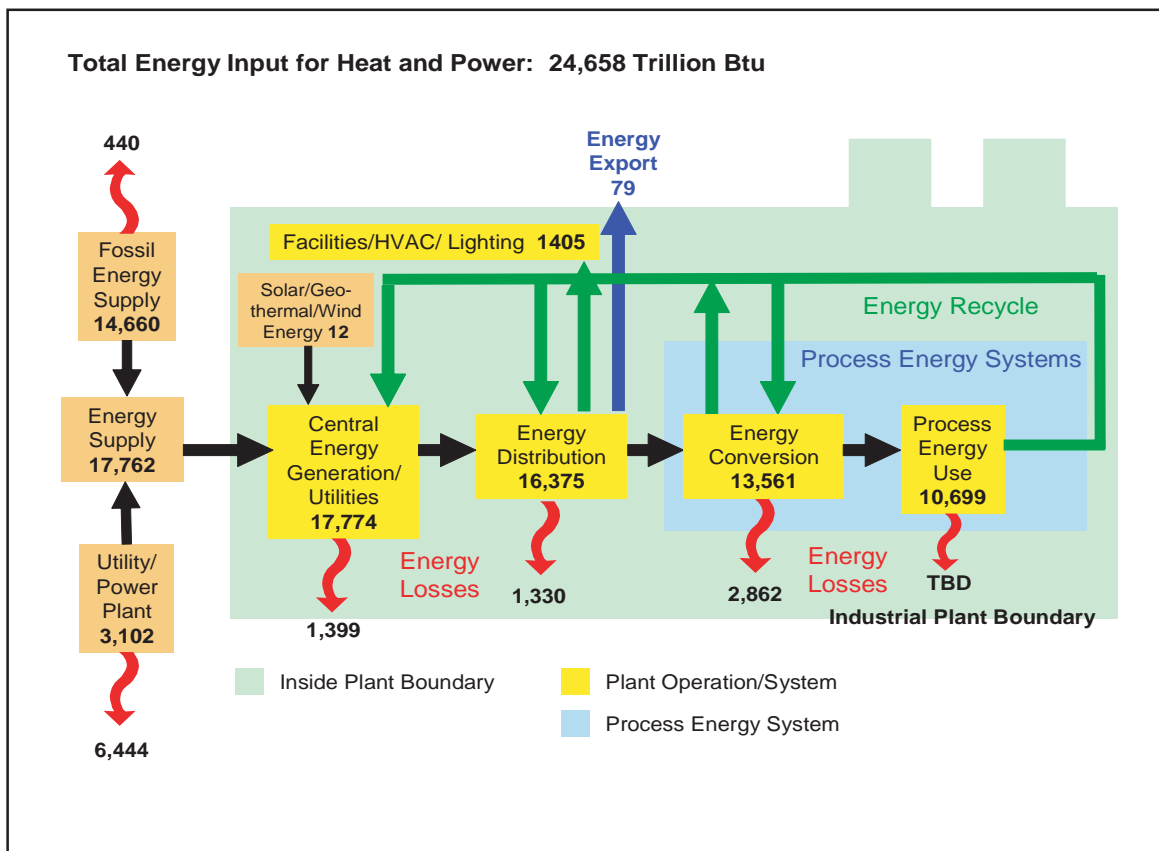
Manufacturing plants use energy to generate steam and power; for direct process heating and cooling; to power machine drives and electrolytic systems; and for heating, cooling, and lighting facilities (see Exhibit 2). In 2001, energy consumption in the U.S. manufacturing sector (which excludes the construction, mining, and agriculture industries that are included in the larger industrial sector) totaled 24,658 trillion Btu (24.7 quads). As indicated in the energy footprint for manufacturing (Exhibit 3), energy losses typically occur during power generation at off-site utilities or while fuels are in transit to the plant site. Energy losses also occur onsite during steam and electricity generation and distribution, process heating and other energy conversion processes, and actual unit process operations.

Exhibit 2
U.S. Manufacturing Energy End Uses



These onsite losses are substantial: of the 17,774 trillion Btu entering manufacturing plants, only 10,699 trillion Btu are available for process-specific industrial operations such as chemical reactors, glass furnaces, and wood pulping units.

Exhibit 3
Energy Footprint for U.S. Manufacturing



THE CHALLENGE

Industry can achieve substantial energy savings by implementing low- or no-cost off-the-shelf technologies and energy management practices. Manufacturing operations consume only 40 percent of industry's primary energy requirements. Losses inside the plant boundary are substantial; companies can realize significant energy efficiency gains by improving in-plant energy generation and distribution systems, process heating equipment, and other plant utility systems. Unfortunately, many industrial plants do not realize that relatively simple, inexpensive operational changes can quickly result in significant cost and energy savings.

A key challenge for ITP's Technology Delivery is to make manufacturers aware that energy conservation can reduce operating and maintenance costs, eliminate waste, improve product quality, increase capacity, and reduce environmental impact. When energy costs are low relative to other production costs, investments in energy efficiency projects typically decline. Upper-management is not always aware of the real operational costs of a proposed energy efficiency change and must be convinced that they can save millions of dollars by implementing energy-saving projects. Based on the experience with the DOE-sponsored PWA activity, a typical industrial facility can realize savings of up to 15 percent with little or moderate capital expenditures. In specific energy systems such as steam, process heating, compressed air, and pumps, savings may amount to more than 30 percent. These savings can dramatically reduce a company's natural gas and electric bills, directly increasing profits.

Approximately 225,000 manufacturing plants are currently operating in the United States. The manufacturing plants can be divided into three groups. The smallest plants have annual energy bills of less than \$100,000 and consume about 1.1 quads/yr, or about 4 percent of the manufacturing energy consumption. There are about 104,000 plants in this group.

The second group consists of plants with annual energy bills between \$100,000 and \$2 million. These plants total about 110,000 and consume 40 percent of the manufacturing energy, or about 10 quadrillion Btu/yr. This group is the focus of the IAC portion of Technology Delivery.

The third group consists of operating plants that have annual energy bills in excess of \$2 million. Although this is the smallest group of plants (about 7,000), they use over 13.3 quads/yr, or about 53 percent of manufacturing energy. These plants are a primary focus of the BestPractices activity. Further analysis of the energy use by manufacturing plants shows that 1 percent of the plants (about 2,250) consume 10.6 quads/yr, or about 42 percent of manufacturing energy.

Replication of energy efficiency technologies and practices presents yet another critical challenge. The energy-efficient methodologies employed by a specific manufacturing or mining plant can also be applied to similar plants within the same company and to other plants in that industrial sector. ITP's Technology Delivery is a means for reaching out to manufacturers, increasing awareness of the potential benefits of improved energy efficiency, and providing tools and other products and services to help realize these benefits.

Strategy for Improving Industrial Energy Efficiency

The U.S. DOE-EERE's Industrial Technology Program leads the federal role in developing advanced energy-efficient and environmentally-friendly industrial technologies. Technology Delivery is the outreach and implementation approach for the Industrial Technologies Program. It employs the crosscutting industrial area of to implement near-term, low-cost, system-based energy solutions across each of its industry portfolios and other energy-intensive industrial sectors, such as food processing. Technology Delivery develops, implements and disseminates best practices in energy management; conducts plant assessments; validates and demonstrates emerging technologies; and encourages corporate energy management strategies. The strategic objectives of ITP's Technology Delivery are:

Energy Savings – Achieve the following annual energy savings through technical assistance in energy management, plant-wide and IAC assessments, and other actions:

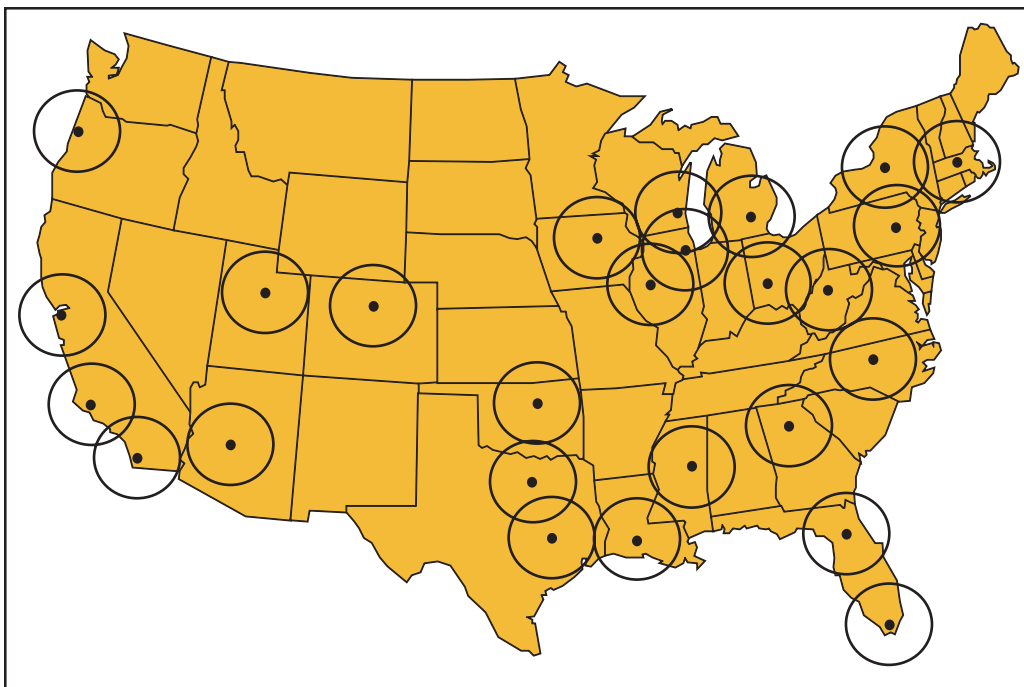
- 197 trillion Btu by 2010
- 464 trillion Btu by 2020

ITP's Technology Delivery is a relatively mature activity within EERE. Over the last several years, certain strategic changes have helped maximize impacts. The strategy focuses on the key challenges – creating awareness of the benefits of energy efficiency and the products and services offered by EERE, and reaching as many of the most energy-intensive manufacturers as possible.

Public-Private Partnerships – Industry-led collaborations, particularly Allied Partnerships, are the primary means that EERE and ITP use to increase awareness within industry. Allied Partners help disseminate energy-efficient technologies; promote the use of EERE software tools, training and information; and encourage technical professionals to participate in qualification training. Of these Allied Partners, EERE seeks large companies, trade associations, or other entities with the capability to reach a large number of end-users. Allied Partners sponsor and conduct training on the EERE software tools, distribute tools and communications products, participate in showcases or other energy events, and promote replication of energy-saving activities and results.

Assessments – Plant assessments and audits identify opportunities to improve overall operations and plant utility system efficiency. ITP pursues energy-intensive manufacturers using two different assessments, depending on the size of the company. Competitively awarded, cost-shared PWAs target large companies, while IAC assessments target small and medium-sized companies (fewer than 500 employees and annual energy costs between \$100,000 and \$2 million). The 26 IACs are distributed across the United States to reach as many companies as possible, with additional clustering in areas densely populated with industrial manufacturing facilities (Exhibit 4).

Exhibit 4
Locations of the 26 Industrial Assessment Centers



Replication of assessment results is essential. PWA awardees are required to deliver a report identifying opportunities, implementation costs, and projected benefits. They must prepare a replication plan for disseminating assessment results to other plants within the company. Using the information in the final report, Technology Delivery develops a case study for dissemination to other companies within that industry (as well as other industries where the results may apply) to achieve additional replication.

For IAC audits, companies are not required to prepare reports, but the results are included in the IAC database, which is accessible through the IAC website. A spreadsheet diagnostic model is undergoing beta testing in order to avoid conducting multiple audits for plants with similar processing lines. This model could help IACs boost the overall implementation rate.

Tool Development – EERE and industry have collaboratively developed tools addressing major plant utility systems that offer significant energy-savings opportunities. These tools enable companies to self-assess their plant's steam, compressed air, motor, pumping, insulation, and process heating systems. EERE holds workshops with industrial partners to determine whether any existing tools need revision, whether new tools need development, and if the current strategy needs modifications to ensure consistency. Collaborations among companies, with assistance from professional organizations and national laboratories, lead this tool development. The EERE tools emphasize a systems approach to improving efficiency and do not compete with industrial tools currently in the marketplace.

Training – Training courses are developed in collaboration with industry champions. Training helps end-users reap the benefits from EERE software tools and analysis techniques. Industry awareness and end-user training enable plant managers to identify energy-savings opportunities for specific utility systems or the entire plant. Qualification training helps industry experts learn to use EERE tools, providing them with the capability to help end-users identify energy-savings opportunities. The growing number of Qualified Specialists enables Technology Delivery to reach more end-users and improve energy efficiency at many industrial plants. Awareness presentations, with a strong focus on these software tools, are now available in the areas of steam, process heating, and compressed air. Similar trainings covering motors, fans, and pumps are currently under development. A Qualified Specialist usually delivers these presentations at trade associations and corporate venues, or through web-based presentations.

Showcase Demonstrations and Energy Events – High-profile showcases and energy events highlight the benefits of energy efficiency and renewable energy technologies. These EERE-wide events demonstrate that improving plant operations increases productivity, cost and energy savings, and environmental benefits. Attendees can observe technologies in place at participating plants and learn about the plants' experiences.

Emerging Technologies and Verification/Validation – The technology verification and validation (V&V) process is another mechanism that promotes and demonstrates emerging technologies. Cost-shared support for these technologies facilitates broad industrial acceptance, easing their entrance into the marketplace.

Outreach – ITP's extensive library includes publications that discuss successful energy management practices. These publications heighten industry awareness and help companies achieve immediate energy-savings. ITP's Technology Delivery has designed a variety of products to meet the needs of different levels of plant personnel, from engineers to managers and CEOs. The BestPractices, IAC, and Energy Savers websites, along with the network of Allied Partners and ITP, provide a steady flow of up-to-date information to manufacturing companies. ITP's Technology Delivery is also revamping its website into a dynamic, user-centric interface that will help each user find information that meets their individual needs quickly.

Metrics Development – The metrics evaluation methodology is continually updated as more energy-savings attributable to Technology Development are discovered. Methodology and results are reviewed annually to estimate the impact ITP's Technology Delivery has on industrial plants. A tracking database records attendance at training sessions and EERE software tool distribution. The database also records other activities that could affect energy use in industrial facilities.

Key Activities

ITP's Technology Delivery has identified a number of key activities to support its strategic objectives:

Public-Private Partnerships

- Sign Allied Partner agreements with key stakeholders.
- Support actions agreed upon in partnership document and document partnership activities.

Assessments

- Issue annual PWA solicitations, conduct assessments, publish case studies and develop a replication plan for each assessment.
- Conduct about 600 IAC assessment days in small and medium-sized plants annually; develop replication strategies and assessment metrics.
- Train all IAC Directors/Assistant Directors to become Qualified Specialists in at least one EERE software tool.

Tool Development

- Continue developing a strategy for creating new software tools and updating existing tools.
- Create overarching Plant Energy Profiler (PEP) tool that will indicate energy-saving opportunities in industrial energy systems.

Training

- Conduct annual awareness, end-user, and Qualified Specialist training in collaboration with industrial partners and DOE regional offices.
- Continue to expand the group of Qualified Specialists and instructors that have a comprehensive knowledge of specific EERE software tools and encourage application of this knowledge among industry end-users.
- Develop a training strategy that involves the creation of more web-based training curricula.

Showcases and Energy Events

- Support showcase events through training sessions, assessments, and development of case studies.
- Conduct regional and state energy events and awareness workshops to promote replication of energy-efficient and renewable energy technologies.

Emerging Technologies and Verification/Validation

- Demonstrate commercial viability of emerging technologies coupled with a verification and validation analysis.

Outreach

- Develop information such as brochures, case studies, CD-ROMs, sourcebooks, technical briefs, tip sheets, and the *Energy Matters* newsletter to create awareness of software tools and resources and encourage implementation and replication of energy efficiency efforts.
- Maintain an updated website that supports program outreach efforts, ensures that ITP's Technology Delivery products are easily accessible, and keeps industry informed about news and events.
- Revamp the existing website into a new user-centric, database-driven website.
- Develop strategies and actions to reach the 7,000 energy-intensive plants that use over 50 percent of the manufacturing and mining energy consumed.
- Assist plants and companies through the EERE Information Center to help them realize significant energy savings and document results.

Metrics Development

- Evaluate annual energy-savings from Technology Delivery activities and extrapolate to future years.
- Record the number of U.S. plants affected annually by EERE technologies, practices, and software tools.

Peer Review

- Conduct annual peer review of ITP's Technology Delivery activities.

FY 2004 HIGHLIGHTS AND ACCOMPLISHMENTS

ITP's Technology Delivery accomplishments are varied and crosscutting. Allied Partners are involved in training, software tool development, and outreach. The following are highlights and accomplishments for FY 2004:

Public-Private Partnerships

- Completed eight new Allied Partner agreements:
 - 3M
 - Armstrong International, Inc.
 - National Pollution Prevention Roundtable (NPPR)
 - NSTAR Electric & Gas
 - Patterson Pump Company
 - Phoenix Technologies, LLC
 - Terranext, LLC
 - Weyerhaeuser

(Note: Appendix A displays a complete list of Allied Partners.)

- Allied Partners sponsored or co-sponsored awareness workshops, qualification training, and end-user training sessions; distributed EERE information and technologies; and collaborated on tool development. The following is a list of FY 2004 highlights.
 - Allied Partners sponsored four out of a total of seven qualification training sessions and 61 out of a total of 80 end-user training sessions.
 - The Compressed Air Challenge (CAC) published a *Best Practices for Compressed Air Systems Manual*. CAC led a qualified instructor orientation workshop for Fundamentals of Compressed Air Systems training and joined a collaborative industry-based technical committee to design a compressor testing and validation program. CAC researched development of a web-based version of *Fundamentals of Compressed Air Systems*. CAC co-sponsored 25 compressed air training sessions, co-sponsored three Qualified AIRMaster+ Specialist Training Sessions, completed technical review on 14 tip sheets and the Compressed Air Scorecard.
 - The Air Movement and Control Association (AMCA) is a key partner in developing and marketing the Fan System Assessment Tool (FSAT) and its affiliated training programs. This involved formation of a working group – consisting of members of AMCA and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) – and a fan technical committee to provide peer review of the FSAT software and complete the beta and final versions of the software and end-user training curriculum. AMCA hosted the first pilot DOE/AMCA-sponsored FSAT end-user workshop in September 2004. AMCA promoted the fan systems sourcebook through their website.
 - The Industrial Heating Equipment Association (IHEA) continued its active participation in the Process Heating Steering Committee and co-sponsored nine Process Heating Assessment and Survey Tool (PHAST) end-user training sessions. IHEA co-sponsored a meeting of the Process Heating Sensors and Controls Subcommittee to review the outcomes of the 2003 LBNL forum and to develop a plan of action. IHEA worked with its members and Process Heating Steering Committee members to organize and promote PHAST end-user and Qualified Specialist trainings, and to obtain technical input during the development of the Process Heating Sourcebook and six Process Heating tip sheets.
 - The Hydraulic Institute (HI) hosted a “Market Transformation” session and invited an EERE representative to be the keynote speaker at the lunch presentation of its Annual Meeting on the subject of transforming the pump market focus from components to system services. DOE and LBNL worked with HI to develop a market transformation panel to produce an agenda for this meeting, which included identifying and recruiting speakers from Alcoa, DuPont, Southern California Edison and NYSERDA. Subsequent discussions and planning within HI have led to the launch of *Pump Systems Matter™*, an education- and awareness-focused market transformation initiative. HI also co-edited and published with EERE *Variable Speed Pumping: A Guide to Successful Applications, Executive Summary*, which provides an overview of the significant cost and energy-savings potential that exists in pumping applications with variable duty requirements. In addition, HI sponsored two Pumping System Specialist Qualification trainings. HI worked with EERE to form volunteer groups; to provide peer review of the pumping systems sourcebook, 11 pumping tip sheets, and pumping system

scorecard; and to provide upgrades to the PSAT software. HI worked with LBNL to produce a white paper on Motor Efficiency for the HI Drivers Committee.

- The American Institute of Chemical Engineers co-hosted the first Texas Industrial Energy Forum.
 - Alcoa, Inc. delivered a presentation during the “Market Transformation” session at HI’s annual meeting. In addition, Alcoa developed “Alcoa Teams with DOE to Reduce Energy Consumption,” a management case study highlighting the company’s corporate approach to energy efficiency and energy management. Alcoa has used its involvement with DOE’s PWA initiative as a springboard for the development of its Energy Services’ Energy Efficiency program. Since the initial PWA at their Lafayette, LA, plant, Alcoa’s energy efficiency network has replicated the assessment process at other facilities, identifying more than \$60 million in potential energy savings. These savings could reduce natural gas consumption by more than 6.5 trillion cubic feet and electricity use by more than 60,000 MWh. To date, Alcoa has realized over \$14 million of this potential.
 - The Glass Manufacturing Industry Council sponsored two BestPractices Awareness presentations.
 - ITT Fluid Technology chaired the “Market Transformation” session at HI’s Annual Meeting, presented a paper at the TAPPI Paper Summit, and sponsored an end-user training session.
 - Rohm and Haas participated in the Steam Steering Committee, the committee for the development of the Plant Energy Profiling tool, and in the BestPractices peer review committee. As a direct result of a PWA, Rohm and Haas implemented projects that reduced energy consumption by \$300,000 per year, including 30 billion Btu/yr in fuel savings and 1,600 MWh/year of electrical power savings. Rohm and Haas then replicated the PWA findings at their largest facility in Houston, TX. Cost-savings totaled over \$18.5 million per year and combined fuel and power savings totaled 4.25 trillion Btu/yr. Rohm and Haas also participated in the pilot Steam System Specialist Qualification training session.
 - Spirax Sarco actively distributed EERE steam information and promoted the Steam System Assessment Tool (SSAT) by advertising in technical journals. In addition, Spirax Sarco participated in the pilot Steam System Specialist Qualification workshop, hosted one Steam System Specialist Qualification training, and co-sponsored two Steam Awareness workshops.
 - The Technical Association of the Pulp and Paper Industry (TAPPI) hosted, sponsored, and prepared program activities for the bi-annual 2004 Paper Summit. This included a morning session on energy BestPractices, featuring presentations on EERE-sponsored plant-wide assessments at pulp and paper facilities. This session was organized by EERE, and moderated by a representative from the DOE Southeast Region.
 - Armstrong International, Inc. participated in the pilot Steam System Specialist Qualification training, sponsoring four steam Awareness workshops.
 - Weyerhaeuser completed a PWA at its New Bern, NC plant that identified more than \$3 million in annual savings. Weyerhaeuser shared these PWA results internally, identifying replication opportunities at 15 mills. The head of this PWA effort worked with a new energy group that used the PWA approach and BestPractices (BP) tools to identify additional replication opportunities. Weyerhaeuser also implemented four PWA replication projects identified using the BestPractices PSAT at their Plymouth, NC, facility. This success prompted management to implement three pumping projects identified in the New Bern, NC PWA and to commit capital for additional project implementation. Weyerhaeuser also co-sponsored two end-user trainings in FY 2004.
 - The Institute for Paper Science and Technology (IPST) Business Development Executives (BDEs) participated in a training session on BestPractices tools and services led by DOE’s Southeast Regional Office. The BDEs marketed BestPractices steam training within the pulp and paper industry, staffed a booth and recruited speakers for the Mill VIP Day at the 2004 Paper Summit, and continued to promote the utilization of BestPractices tools and services to the forest products industry via personal onsite mill visits and other means. IPST also co-sponsored one end-user training in FY 2004.
- Other Allied Partnership activities include:
 - More than 444 activities recorded in the tracking database.
 - More than 13,466 documents requested for distribution.
 - Active involvement of the steam and process heating steering committees.
 - Collaboration with the International Copper Association on the development of the MotorMaster+

International tool.

- Collaboration with the Alliance to Save Energy on steam outreach.

Assessments

- Eight PWAs were completed (final report received):
 - Jernberg Industries, Chicago, IL
 - Pechiney, Ravenswood, WV
 - Sawbrook Steel, Cincinnati, OH
 - Metaldyne, Royal Oak, MI
 - Coeur Rochester, Lovelock, NV
 - Osram Sylvania, Exeter, NH
 - Dow Chemical, Freeport, TX
 - Valero, Houston, TX
- Ten plants implemented PWA recommendations and realized savings:
 - Inland Paper, Rome, GA
 - Blue Heron Paper, Oregon City, OR
 - Shell Martinez Refinery, Martinez, CA
 - Formosa Plastics, Port Comfort, TX
 - North Star Steel, Wilton, IA
 - Jernberg Industries, Chicago, IL
 - Sawbrook Steel, Cincinnati, OH
 - Metaldyne, Royal Oak, MI
 - Appleton Ideas, West Carrollton, OH
 - Neville Chemicals, Anaheim, CA
- Eight companies replicated PWA findings and methodology:
 - Alcoa
 - Amcast
 - Formosa Plastics
 - Rohm & Haas
 - Weyerhaeuser
 - Metaldyne
 - Shell Oil and Shell Chemicals
 - Neville Chemicals
- The IAC completed the update of the IAC online database and completed 635 plant assessments (722 assessment days).

Tool Development

- Completed the development of and released: 1) NO_x and Energy Assessment Tool (N_xEAT), 2) Fan System Assessment Tool (FSAT), and 3) MotorMaster+ International.
- Identified upgrades to Pump System Assessment Tool (PSAT).
- Completed AMCA review of Fan System Assessment Tool (FSAT).
- Completed updates to Steam System Assessment Tool (SSAT).
- Continued development and testing of the Plant Energy Profiling (PEP) Tool in collaboration with Veritech, Inc.
- Drafted a “tool strategy” – a plan to enhance the energy-savings impacts of the ITP software tools.

Training

- Completed 80 End-User Workshops, with 1,512 end-users trained in best practices for energy management in the following areas: compressed air, motors, process heating, and steam systems. Training also included use of BestPractices system software tools.
- Completed seven Specialist Qualification Workshops, with 59 participants passing the exam to become Qualified Specialists in the use of a specific software tool.
- Completed 32 awareness presentations or web-casts with 866 participants.
- Completed curricula for 1) Steam System Qualified Specialist training, 2) Process Heating Awareness training, and 3) Fan System Assessment end-user training.

Showcase and Energy Events – Northeast Energy & Technology Expo

- Hosted by U.S. DOE and the State Industrial Efficiency Partnerships of MA, ME, NH, and CT, with more than 150 attendees.
- Included 12 tracks featuring more than 30 national speakers addressing energy efficiency, industrial productivity, power generation, and the environment. Applied Proactive Technologies, Inc., E3M, Inc., University of Massachusetts (U-Mass) IAC, Process Energy Services, LLC, Oak Ridge National Lab (ORNL), and National Grid USA were among the entities that delivered presentations on energy systems and DOE software tools.

Showcase and Energy Events – IPST/TAPPI Paper Summit

- The Technical Association of the Pulp and Paper Industry (TAPPI) held its bi-annual Paper Summit in Atlanta, GA. During Mill VIP Day, a special session on plant assessments was organized with assistance from the Institute of Paper Science and Technology (IPST), TAPPI, DOE's Southeast Regional Office, and LBNL. This session featured several mills that have participated in the DOE PWA program. DOE's Southeast Regional Office moderated the session, which also included presentations by ORNL and ITT Fluid Technology.

Emerging Technologies and Verification and Validation (V&V)

- Successfully completed commercial-scale demonstration of Nickel Aluminide Rolls in a Heat-Treating Furnace at the International Steel Group's (formerly Bethlehem Steel Corporation) Burns Harbor Plate Mill and issued a draft V&V report.
- Continued work on the demonstration and V&V analyses of the following projects:
 - Multi-Partner Demonstration of Energy-Efficient and Environmentally Improved Methods for the Production of Polyurethane Foam (Air Products)
 - Production of Line Field Test of In-line, Fluidized Bed, Rapid Heat Treatment System (Amcast Industrial Corporation)
 - Improving Taconite Processing Plant Efficiency by Computer Simulation (Ispat Inland Mining Company)
- Continued work on the following V&V evaluations (no Technology Delivery funding of the demonstration portion of these projects):
 - Development of the Pilot Plant for Field Test of Low-Temperature Plasma Technologies for Treating Volatile Organic Compound Emissions from Pulp Mills and Wood Products Plants (Georgia Pacific).
 - Process Heater UltraLow Air Control Industrial Air Centers (Valero).
 - Completed analysis of pre-and post implementation data for Mill-Wide Advanced Quality Control System (Augusta Newsprint).

Outreach

- Issued more than 80 new outreach materials, including:
 - PWA case studies: 10
 - Allied Partner case studies: 6
 - Corporate energy management case studies: 7
 - Industrial Assessment Center case studies: 6
 - Steaming Ahead 2002 on CD-ROM
 - Compressed Air System Performance: A Sourcebook for Industry
 - Process Heating System Performance: A Sourcebook for Industry
 - *Partnering for Success* document
 - *Variable Speed Pumping: A Guide to Successful Applications Summary* (with HI)
 - Process Heating fact sheet on PWA opportunities
 - Fact sheets on end-user training and Qualified Specialist training
 - Tip sheets: four steam, 14 compressed air
 - *Evaluation of Compressed Air Training Challenge Training Program* report
 - Updated *Decision Tools* CD for Industry
 - *ITP E-Bulletin*: nine issues
 - *Energy Matters* and *Energy Matters Extra*: four editions each
 - *Steaming Ahead* electronic newsletter: six bi-monthly issues
- Distributed more than 20,000 copies of BestPractices communications products.

- Documented more than 900,000 page views, and more than 1.8 million downloads from the BestPractices and IAC websites.
- Conducted 11 steam awareness workshops, with participation by over 516 attendees.
- Provided software tools, technical assistance, and ITP publications through the EERE Information Center directly to over 800 plants, of which at least 250 are among the top 5,000 most energy-intensive plants in the United States.
- Identified 139 opportunities for collaboration to achieve enhanced participation of industrial partners.

ITP Peer Review Outcome as Related to Technology Delivery

- The Technology Delivery portfolio was reviewed as part of the ITP Corporate Peer Review on March 9-10, 2004. This peer review brought industry stakeholders and government partners together to review the mission, strategies and future direction of the Industrial Technologies Program, including a strategic overview of Technology Delivery.
- The peer review commended several aspects of the Technology Delivery portfolio:
 - PWAs
 - IAC activities
 - Qualified Specialist certification
 - Technical assistance provided by the EERE Information Center
 - Available training courses on DOE software tools
 - Development of the NO_x Tool
 - Development of the Plant Energy Profiler Tool
- Peer Review recommendations for improving the program included:
 - Differentiating low-cost savings opportunities from capital requirements.
 - Developing partnerships at the corporate level to better understand management strategies.
 - Increasing the use of training and Qualified Specialists to promote ITP activities.
 - Improving corporate awareness of the bottom-line benefits of energy-savings opportunities.
 - Improving tool and training session follow-ups to accurately track changes.

Metrics Development

- ITP's Technology Delivery actions impacted about 2,000 new plants.
- A Peer Review of BestPractices metrics was completed. The Peer Review team's input assisted in the modification of the methodology for obtaining BestPractices energy-savings. Energy-savings for FY 2003 activities were estimated to be 40 trillion Btu.
- 296 students at 26 universities participated in the IAC program element.

TOOLS, PUBLICATIONS, AND RESOURCES AVAILABLE

EERE offers valuable tools and publications to help industrial companies improve productivity and energy efficiency. Some of these resources are described below. Visit the website at <http://www.eere.energy.gov/industry/bestpractices> for a complete listing. You can order tools by e-mailing eeic@ee.doe.gov or by calling the EERE Information Center at 1-877-377-3463.

TOOLS

- ASDMaster: Adjustable Speed Drive Evaluation Methodology and Application
- AIRMaster+
- MotorMaster+ 4.0
- MotorMaster+ International
- NO_x and Energy Assessment Tool (N_xEAT)
- Process Heating Assessment and Survey Tool (PHAST)
- Pumping System Assessment Tool (PSAT)
- Steam System Assessment Tool (SSAT 1.0.0)
- Steam System Scoping Tool
- 3E Plus, Version 3.2
- Decision Tools for Industry (CD), which contains MotorMaster+ 4.0, PSAT, AIRMaster+, SSAT, Steam System Scoping Tool, 3E Plus and PHAST

CASE STUDIES

- Plant-Wide Assessment Case Studies
 - Aluminum
 - Chemicals
 - Forest Products
 - Glass
 - Metal Casting
 - Mining
 - Petroleum
 - Plant-wide Assessment Summaries
- Case Studies by Industry
 - Aluminum
 - Chemicals
 - Forest Products
 - Glass
 - Metal Casting
 - Mining
 - Petroleum
 - Steel
 - Other Industries
- Case Studies by Industrial System
 - Compressed Air
 - Motors
 - Process Heating
 - Pumping Systems
 - Steam
 - Multiple Systems
 - Other Systems
- Management Case Studies

SOURCEBOOKS

- *Improving Compressed Air System Performance: An Industry Sourcebook*
- *Improving Fan System Performance: A Sourcebook for Industry*
- *Improving Pumping System Performance: A Sourcebook for Industry*
- *Improving Process Heating System Performance: A Sourcebook for Industry*
- *Improving Steam System Performance: A Sourcebook for Industry*

OTHER PUBLICATIONS

- Technical fact sheets and handbooks (including technical briefs and guides)
- Tip sheets
- Market assessments
- Repair documents

DATABASES

- Industrial Assessment Center (IAC) Database
- National Inventory of Manufacturing Assistance Programs (NIMAP)

HOW TO GET INVOLVED AND CONTACT INFORMATION

How to Get Involved

Investigate Assessment Opportunities: ITP's Technology Delivery supports two kinds of assessments based on the size of the manufacturing plant. All plants can apply for a cost-shared PWA. Solicitations for these competitively-awarded assessments are typically issued annually; announcements are posted at <http://www.eere.energy.gov/industry/bestpractices/solicitations.shtml>. Small and medium-sized plants are eligible for no-cost assessments performed by one of 26 university-based Industrial Assessment Centers. Visit <http://www.eere.energy.gov/industry/iac> for more information.

Getting Started: ITP's Technology Delivery provides numerous tools, guides and other publications that can help you get started on your own energy efficiency improvement program. The following resources are a good place to get started:

- *A Self-Assessment Workbook for Small Manufacturers*
- The publications library on the BestPractices website, <http://www.eere.energy.gov/industry/bestpractices/library.shtml>
- The databases of service providers on the BestPractices website, <http://www.eere.energy.gov/industry/bestpractices/databases.shtml>

To speak directly with someone equipped to help you find information about BestPractices, or any other areas within ITP, you can contact the EERE Information Center. The EERE Information Center's knowledgeable staff can answer specific inquiries about optimizing the energy efficiency of industrial systems, help you obtain and use software tools, supply publications and provide contacts for further information. Email the [EERE Information Center](mailto:eeic@ee.doe.gov) (eeic@ee.doe.gov) or call 1-877-337-3463. The mailing address of the warehouse is:

EERE Information Mail Center c/o RSIS
220 Girard, Suite H
Gaithersburg, MD 20877

Use Energy-Saving Software and Get Training: The EERE Information Center distributes copies of the following software tools at no charge:

- [AIRMaster+](#): assesses compressed air systems
- [ASDMaster](#): evaluates adjustable speed drives and their application
- [3E Plus](#): determines whether boiler systems can be optimized through the insulation of boiler steam lines
- [MotorMaster+ 3 and MotorMaster+International](#): assists in selecting and managing energy-efficient motors
- [Process Heating Assessment and Survey Tool \(PHAST\)](#): assesses process heating systems
- [Pumping System Assessment Tool \(PSAT\)](#): assesses the efficiency of pumping systems
- [Steam System Assessment Tool](#): assesses steam systems
- [Steam System Scoping Tool](#): profiles and grades steam system operations and management
- [Decision Tools for Industry](#): contains MotorMaster+ 4.0, PSAT, Steam System Scoping Tool, 3E Plus and AIRMaster+

ITP's Technology Delivery training helps end-users reap the benefits of tools and analysis techniques. Courses range from half-day to two-and-a-half days, depending on the level of detail. Training is offered throughout the year and around the country. To find upcoming training events (and links to more details on each event), visit: <http://www.eere.energy.gov/industry/bestpractices/textCalendar.shtml>.

Stay Up-to-Date: The BestPractices website is updated daily to reflect news and upcoming activities (see our calendar at <http://www.eere.energy.gov/industry/bestpractices/textCalendar.shtml>). To find ITP solicitations for BestPractices activities, visit <http://www.eere.energy.gov/industry/bestpractices/solicitations.shtml>. For the Industrial Assessment Centers, visit <http://www.eere.energy.gov/industry/iac/solicitations.shtml>. Office-wide solicitations are posted on the ITP website at <http://www.eere.energy.gov/industry/working/solicitations.shtml>.

Where to Go to Get More Information

Visit the websites: www.eere.energy.gov/bestpractices
www.eere.energy.gov/iac

Learn about all EERE programs: www.eere.energy.gov

EERE Information Center answers questions on EERE's products, services, and 11 technology programs. The Center refers callers to the appropriate EERE resources and refers qualified callers to expert networks. You may contact the EERE Information Center by calling 1-877-EERE-INF (1-877-337-3463) or by completing the form at this site: <http://www.eere.energy.gov/informationcenter>. A customer service specialist or energy expert at the EERE Information Center will respond to your inquiry.

For print copies of DOE, EERE, and ITP Publications, contact the
Energy Efficiency and Renewable Energy Information Center
P.O. Box 43165
Olympia, WA 98504-3165
<http://www.eere.energy.gov/informationcenter/>

For information regarding ITP's Technology Delivery activities, please contact:

BestPractices:
Peter Salmon-Cox
Industrial Technologies Program
Office of Energy Efficiency and Renewable Energy
EE-2F
1000 Independence Avenue, SW
U.S. Department of Energy
Washington, DC 20585-0121
Phone: 202-586-8350
Fax: 202-586-7114
E-mail: peter.salmon-cox@ee.doe.gov

Industrial Assessment Centers:
Sandy Glatt
Central Regional Office
U.S. Department of Energy
1617 Cole Boulevard
Golden, CO 80401
Phone 303-275-4857
Fax: 303-275-4830 (fax)
E-mail: sandy.glatt@ee.doe.gov

Plant-Wide Assessments
Grace Ordaz
Industrial Technologies Program
Office of Energy Efficiency and Renewable Energy
EE-2F
1000 Independence Avenue, SW
U.S. Department of Energy
Washington, DC 20585-0121
Phone: 202-586-8350
Fax: 202-586-7114
E-mail: grace.ordaz@ee.doe.gov

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APPENDIX A: ALLIED PARTNERS

EERE and BestPractices Allied Partners

3M
A&M Compressed Air Products
Accurate Air Engineering, Inc.
Air Equipment, Inc.
Air Movement and Control Association International, Inc. (AMCA)
Air Perfection, Inc.
Air Power of New England
Air Power of USA, Inc.
Air Science Engineering, Inc.
Air System Management, Inc.
Airite, Inc.
Alcoa, Inc.
Aluminum Association, Inc.
American Boiler Manufacturing Association (ABMA)
American Institute of Chemical Engineers (AIChE)
Armstrong International, Inc.
Arrow Pneumatics, Inc.
ASM International
Atlas Machine and Supply, Inc.
Burgmann Seals America
Cal Supply Company, Inc.
Cochrane Compressor Company
Compressed Air & Gas Institute (CAGI)
Compressed Air Challenge, Inc.
Compressed Air Management, Inc.
Compressed Air Systems, Inc.
Compressor Distributors Association (CDA)
Council of Industrial Boiler Owners (CIBO)
Domnick Hunter, Inc.
Draw Professional Services
Energy Machinery, Inc.
Energy Solutions Center
Engineering Sales Associates
Fairbanks Morse
Flowserve Corporation
FMC Corporation
Forging Industry Association
Glass Manufacturing Industry Council (GMIC)
Glauber Equipment Corporation
Glidepath Holdings LLC
Hanson Aggregates East
Hydraulic Institute
HydroAire, Inc.
I&M Industries, Inc.
Industrial Air Centers
Industrial Heating Equipment Association (IHEA)
Institute of Paper Science and Technology (IPST)
Iron and Steel Society
ITT Fluid Technology
John R. Wald Company, Inc.
Kaeser Compressors
Metal Powder Industries Federation

Metal Processing Institute
Millennium Chemicals, Inc.
National Association of State Energy Officials (NASEO)/Association of State Energy Research and Technology Transfer Institutions (ASERTTI)
National Insulation Association (NIA)
National Pollution Prevention Roundtable (NPPR)
NSTAR Electric & Gas
Patterson Pump Company
Phoenix Technologies, LLC
Pneumatic/ConservAIR Technologies Company
Power Supply Industries
Remco Equipment Company
Rogers Machinery Co.
Rohm & Haas Company
Sacramento Municipal Utility District
Scales Air Compressor Corporation
Secat, Inc.
Society of the Plastics Industry, Inc.
Spirax-Sarco, Inc. (SSI)
Sterling Fluid Systems (USA), Inc.
Strategic Air Concepts
Technical Association of the Pulp & Paper Industries (TAPPI)
Terranext, LLC
Tide Air, Inc.
UE Systems, Inc.
Weir Specialty Pumps
Weyerhaeuser

Motor Challenge Allied Partners

Advanced Energy Corporation
Ameren Services
American Electric Power
American Water Works Association
Applied Industrial Technologies
Applied Proactive Technologies, Inc.
ASDtech Associates
Association of Facilities Engineers
Austin Energy
Baker Instrument Company
Baldor Electric Company
BJM Corporation
Bonneville Power Administration
Brithinee Electric
Building Controls & Services, Inc.
Burlington Electric Department
CEC Consultants, Inc.
Chelan County P.U.D No. 1
City Utilities of Springfield
Clark Public Utilities
Colorado Springs Utilities
Consortium for Energy Efficiency, Inc.

Copper Development Association, Inc.
 Delaware Manufacturing Extension Partnership
 Dreisilker Electric Motors, Inc.
 Eastland Industries, Inc.
 Electric Enterprise, Inc.
 Electric League of the Pacific Northwest
 Electric Motor Supply, Inc.
 Electric Motors & Drives, Inc.
 Electrical Apparatus Service Association
 ElectriCities of North Carolina
 Emerson Electric/Dayton Motors
 Energy Center of Wisconsin
 Ensav Energy Performance, Inc.
 Entergy Corp.
 Etc Group, Inc.
 Fiolo Corporation
 Florida Power & Light Company
 Gainesville Regional Utilities
 GE Industrial Control Systems
 General Electric Corporation
 Georgia Power Company
 Hawaiian Electric Company
 Hayes & Lunford Electric Motor Repair, Inc.
 HECO, Inc.
 Holzer Energy Management Company
 Honeywell DMC Services, Inc.
 HIS Electric, Inc.
 HydroTech Services, Inc.
 IBT, Inc.
 Industrial Supplies, Inc.
 J & R Consulting, Inc.
 Kalen Electric and Machinery Co., Inc.
 Kaman Industrial Technologies
 Longo Industries
 Lower Colorado River Authority
 MagnaDrive Corporation
 MEAG Power
 Meier Transmission, Ltd.
 Mississippi Power Company
 Motion Industries, Inc.
 Motor Technology, Inc.
 National Electric Motor & Supply Company
 New York State Energy R&D Authority
 North Carolina A&T State University
 North Carolina State University
 Northeast Energy Efficiency Partnerships, Inc.
 Northeast Utilities Service Company
 Northwest Energy Education Institute
 Northwest Energy Efficiency Alliance
 Ohio Department of Development/Energy Efficiency
 Osborn Engineering Company
 Pacific Gas and Electric Corporation
 PEPCO Service, Inc.
 Planergy International, Inc.
 Productive Energy Solutions, LLC
 Progressive Maintenance Technologies
 PWI Energy

Reading Electric
 Rockwell Automation
 Rural Electric Cooperative, Inc.
 Shoemaker Industrial Solutions
 SM Service & Technology
 Snohomish County PUD
 Southern California Edison
 Southern Minnesota Municipal Power Authority
 Stanco Power Systems, Inc.
 Sterling Energy Services, Inc.
 Tampa Electric Company
 Technology Resources & Development Corporation
 (TRD)
 TechSOLVE, Inc.
 Tennessee Tech University
 United Electric Supply
 University of Alabama in Huntsville

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and great energy independence for America. By investing in technology breakthroughs today, our nation can look forward to a more resilient economy and secure future.

Far-reaching technology changes will be essential to America's energy future. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a portfolio of energy technologies that will:

- Conserve energy in the residential, commercial, industrial, government, and transportation sectors
- Increase and diversify energy supply, with a focus on renewable domestic sources
- Upgrade our national energy infrastructure
- Facilitate the emergence of hydrogen technologies as a vital new "energy carrier"

The Opportunities

Biomass Program

Using domestic, plant-derived resources to meet our fuel, power, and chemical needs

Building Technologies Program

Homes, schools, and businesses that use less energy, cost less to operate, and ultimately, generate as much power as they use

Distributed Energy & Electric Reliability Program

A more reliable energy infrastructure and reduced need for new power plants

Federal Energy Management Program

Leading by example, saving energy and taxpayer dollars in federal facilities

FreedomCAR & Vehicle Technologies Program

Less dependence on foreign oil, and eventual transition to an emissions-free, petroleum-free vehicle

Geothermal Technologies Program

Tapping the Earth's energy to meet our heat and power needs

Hydrogen, Fuel Cells & Infrastructure Technologies Program

Paving the way toward a hydrogen economy and net-zero carbon energy future

Industrial Technologies Program

Boosting the productivity and competitiveness of U.S. industry through improvements in energy and environmental performance

Solar Energy Technology Program

Utilizing the sun's natural energy to generate electricity and provide water and space heating

Weatherization & Intergovernmental Program

Accelerating the use of today's best energy-efficient and renewable technologies in homes, communities, and business

Wind & Hydropower Technologies Program

Harnessing America's abundant natural resources for clean power generation

To learn more, visit www.eere.energy.gov

Technology Delivery

Industrial Technologies Program

Boosting the productivity and competitiveness of U.S. industry through improvements in energy and environmental performance



U.S. Department of Energy
Energy Efficiency and Renewable Energy

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